



DEPARTMENT OF
ECOLOGY
State of Washington

**Technical Support Document for
Prevention of Significant Deterioration
Permit No. 01-09, Amendment 7**

*Northwest Pipeline LLC
Mount Vernon Compressor Station
Mount Vernon, Washington*

January 2020

Publication and Contact Information

For more information contact:

Air Quality Program
P.O. Box 47600
Olympia, WA 98504-7600
Phone: 360-407-6800

Washington State Department of Ecology — www.ecology.wa.gov

- Headquarters, Olympia 360-407-6000
- Northwest Regional Office, Bellevue 425-649-7000
- Southwest Regional Office, Olympia 360-407-6300
- Central Regional Office, Union Gap 509-575-2490
- Eastern Regional Office, Spokane 509-329-3400

To request ADA accommodation including materials in a format for the visually impaired, call Ecology at 360-407-6800 or visit <https://ecology.wa.gov/accessibility>. People with impaired hearing may call Washington Relay Service at 711. People with speech disability may call TTY at 877-833-6341.

**Technical Support Document for
Prevention of Significant Deterioration
No. 01-09, Amendment 7**

*Northwest Pipeline LLC
Mount Vernon Compressor Station
Mount Vernon, Washington*

Air Quality Program
Washington State Department of Ecology
Olympia, Washington

This page is purposely left blank

Table of Contents

	<u>Page</u>
List of Tables	vi
1. Executive Summary	1
2. Prevention of Significant Deterioration in Washington State.....	2
3. Project and Site Description.....	3
3.1. Project description	3
3.2. Site description.....	3
3.3. PSD permit history.....	3
4. Permit Revision Discussion	7
4.1. Monitoring frequency	7
4.2. Portable analyzer accuracy verification	8
4.3. NO _x emission limit averaging period for the Sellers C-80-w boiler	8
4.4. Access and sampling ports requirements	8
4.5. Operating rate during compliance test for combustion turbine	9
5. State Environmental Policy Act.....	10
6. Environmental Justice Review.....	11
7. Public Involvement	12
8. Agency Contact.....	13
Acronyms and Abbreviations	14

List of Tables

	<u>Page</u>
Table 1: Summary of Revised Project Net Emissions Increase.....	4
Table 2: Emission Units Affected by this Permit	6

1. Executive Summary

Northwest Pipeline has asked to revise the nitrogen oxide monitoring requirements for the Mars 90S and Centaur 50S combustion turbines at the Mount Vernon Compressor Station. Northwest Pipeline proposes to:

- Monitor nitrogen oxide using portable emission analyzers at least once every 4,380 hours of turbine's operation.
- Remove the requirement to verify the accuracy of portable analyzers.

Ecology's assessment of Northwest Pipeline's request:

- Approves:
 - The proposed monitoring frequency.
 - Accuracy verification of the portable analyzers is not needed because there is sufficient quality assurance in the test method itself.
- Amendment makes requirements more clear.
- Additional emission testing after each engine exchange.

Northwest Pipeline is a natural gas pipeline that takes gas from western Canada and the Rocky Mountains into Washington. The facility is located about nine miles east of Mount Vernon. The area is designated as meeting national air quality standards (in attainment).

After reviewing Northwest Pipeline's request, Ecology proposes to approve this request, with an additional requirement. This technical support document shows Ecology's analysis supporting our decision.

2. Prevention of Significant Deterioration in Washington State

PSD permitting requirements in Washington State are established in Title 40, Code of Federal Regulations (CFR) §52.21, Washington Administrative Code (WAC) 173-400-700 through 750. Washington State implements its PSD program as a State Implementation Plan (SIP)-approved program. This SIP-approved program became effective May 29, 2015.¹

The objective of the PSD program is to prevent significant adverse environmental impact from emissions into the atmosphere by a proposed new major source, or major modification to an existing major source. The program limits degradation of air quality to that which is not considered “significant.” PSD rules require the utilization of BACT for certain new or modified emission units, which is the most effective air pollution control equipment and procedures that are determined to be available after considering environmental, economic, and energy factors.

PSD rules are designed to keep an area with “good” air in compliance with the NAAQS and Class I requirements. The distinctive requirements of PSD are BACT, air quality analysis (allowable increments and comparison with the NAAQS), and analysis of impacts of the project on visibility, vegetation, and soils.

¹ 80 FR 23721, April 29, 2015.

3. Project and Site Description

3.1. Project description

Northwest Pipeline LLC (NWP) has requested revisions to the PSD 01-09, Amendment 6 to revise the nitrogen oxide (NO_x) monitoring requirements for the Mars 90S and Centaur 50S combustion turbines. NWP proposes to monitor the NO_x emission using portable emission analyzer at least once every 4,380 hours of operation, less frequent than the existing monitoring requirement in the permit. NWP also proposes to remove the requirement to verify the accuracy of portable analyzers.

3.2. Site description

NWP operates a natural gas pipeline system from the Washington-Canada border near Sumas, Washington (WA), to the San Juan Gas Fields in New Mexico. The gas pipeline system serves commercial, industrial, utility, and cogeneration customers in Washington, Oregon, Nevada, and California. The Mount Vernon Compressor Station is located at 15498 Lange Road, Mount Vernon, WA 98273, about five miles east of Mount Vernon, WA, and assists in the transport of natural gas from the Sumas Compressor Station to the Snohomish Compressor Station.

This site is:

- About 57 kilometers (km) from the nearest Class I area, North Cascades National Park.
- Within 100 km of four other Class I areas (Alpine Lakes Wilderness, Glacier Peak Wilderness, Olympic National Park, and Pasayten Wilderness).
- About 45 kilometers from the U.S.–Canadian border.
- Located within a Class II area that is currently designated in attainment for all national and state air quality standards
- A major stationary source. The Mount Vernon Compressor Station has potential to emit 390 tons per year (tpy) of NO_x and 460 tpy of CO.

3.3. PSD permit history

3.3.1. PSD 01-09

The permit authorized the following:

- Adding one Mars 90-TI3002S (Mars 90S) gas turbine site-rated at 12,787 horsepower (59°F).
- Substituting an existing Centaur 40-T4500 upgraded to a Centaur 50-T6100S (Centaur 50S) at 5,950 hp (59°F.) for the originally permitted Centaur 40-T4700S (Centaur 40S) gas turbine site-rated at 4,554 horsepower.

- Replacing an existing standby generator with one of larger capacity (450 kW) as originally permitted.
- Replacing an existing 2.5 million British thermal units per hour (MMBtu/hr) heater/boiler with one of larger capacity (3.348 MMBtu/hr Sellers C-80-w) as originally permitted.

The project's net emission of NO_x is estimated to be 62.8 tpy. No other pollutant triggered PSD review.

3.3.2. PSD 01-09, Amendment 1

PSD 01-09 was amended because NWP proposed to change the scope of project approved originally. NWP proposed to:

- Install one Mars 90-TI3002S (Mars 90S) gas turbine site-rated at 12,787 horsepower (59° F.) as originally permitted.
- Remove the existing Solar Centaur 40-T4500 permitted under PSD 93-01 and replace it with a larger Solar Centaur 50S rather than keeping the existing turbine and adding another Centaur 40S as was originally permitted in PSD 01-09.
- Replacing an existing standby generator with one of larger capacity (450 kW) as originally permitted.
- Replacing an existing 2.5 MMBtu/hr heater/boiler with one of larger capacity (4.186 MMBtu/hr Sellers C100) as originally permitted.
- After completion of one year of operation, it was determined that the parametric monitoring system (PEMS) could not provide accurate real time monitoring of emissions from the turbines. WDOE, the NWCAA, and NWP-MVCS subsequently agreed that the PEMS would be replaced by a monitoring procedure using a portable emission analyzer measuring emissions on a prescribed schedule.

See table below for the summary of the revised project net emissions increase.

Table 1: Summary of Revised Project Net Emissions Increase

Pollutant	Emission (tpy)
Nitrogen oxides (NO _x)	52.71
Carbon monoxide, (CO)	74.4
Sulfur dioxide, (SO ₂)	2.26
Volatile organic compounds, (VOCs)	23.24
Particulate matter less than 10 micrometers in diameter (PM ₁₀)	4.64

3.3.3. PSD 01-09, Amendment 2

NWP and Ecology discovered the inability of the Predictive Emissions Monitoring System (PEMS) to accurately predict real-time emissions. This finding was based upon completion of one year of PEMS data gathering and analysis, and Ecology agreed with NWP. There was no change to emission limits in the second amendment as well. Therefore, public notice was not required.

3.3.4. PSD 01-09, Amendment 3

To implement changes requested by NWP that clarified and streamlined the permit. There were no changes to the emission limits in this amendment. Therefore, public notice was not required.

3.3.5. PSD 01-09, Amendment 4

To revise the emissions testing frequency for the boiler (Seller C-80-w with heat input of 3.348 MMBtu/hr) and standby generator. NWP requested that Ecology change the permitted frequency of NO_x performance tests from an annual basis to every five years starting from the date of the most recent compliance test.

At their fully allowed operating time, NO_x emissions from the standby generator and the boiler together are less than three-quarters of a ton per year. Ecology agreed that a once every five years emissions test for these small emission units was satisfactory to assure air quality protection.

3.3.6. PSD 01-09, Amendment 5

To allow a reduction in the required frequency of NO_x routine monitoring testing. A portable emissions analyzer is used for these routine monitoring tests. More than three years of testing every 14 days had shown that testing every 28 days was sufficient to monitor compliance. There were no changes to emission limits in Amendment 5.

3.3.7. PSD 01-09, Amendment 6

To clarify and simplify NO_x monitoring and reporting procedures used by portable NO_x monitors in preparation for renewal of the facility's Title V permit. Testing using a portable analyzer to monitor the volume percent of NO_x every 336 hours has proven adequate to indicate compliance, so the additional calculation of NO_x mass flow during these periodic tests is no longer required. If noncompliance is indicated by a portable monitor test, the turbine will now be shut down as soon as reasonably possible and repaired rather than have further emissions testing. No compliance testing conditions for NO_x (reference Method 20) are affected by these changes, but the NO_x limit's averaging time is reduced from a three- to one-hour time period, which is more stringent.

3.3.8. Affected emission units

The emission units affected by this permit are listed below.

Table 2: Emission Units Affected by this Permit

Emission Unit Description	Design Capacity
Solar Mars 90-T13002S gas turbine	100.3 MMBtu/hr @ 59°F
Solar Centaur 50-T6100S gas turbine	54.93 MMBtu/hr @ 59°F
Sellers C-80-W water heater/boiler	3.35 MMBtu/hr
Caterpillar-G3412, emergency electrical generator	450 kW

4. Permit Revision Discussion

Ecology reorganizes and streamlines the permit conditions, including removing the obsolete languages with this permit revision. The original condition language in PSD 01-09, Amendment 6 is included as attachment to this technical support document for ease of comparing the changes. Some of the more significant and noteworthy changes are discussed below.

4.1. Monitoring frequency

Based on the existing permit requirements, Mars 90S and Centaur 50S combustion turbines are subject to NO_x emission limit of 25 parts per million on a dry volumetric basis (ppmdv) over a 1-hour average when corrected to 15.0 percent oxygen, ISO. EPA RM20 determines compliance with the emission limit, and the testing frequency is no later than 13 months after the previous test.

In addition to reference method test, the permit also requires that NWP monitor the NO_x concentration at least once every 336 hours of turbine operation using portable analyzer. If six consecutive monitoring results show that the NO_x concentration is below the emission limit, the monitoring frequency can be reduced to at least once every 672 hours of turbine operation.

NWP proposes to monitor the NO_x emission using portable emission analyzer at least once every 4,380 hours of operation. As part of the information received for this permit amendment, Ecology learned from the facility's monitoring result that the monitored NO_x concentration exceeded the limit during 2015 and 2016 on three occasions. On each occasion, NWP concluded that the cause of exceedance is pilot settings for horsepower were not properly established following the engine exchange. The exceedances resulted in approximately 998 pounds of NO_x excess emissions (from facility's Title V Statement of Basis) offer some perspective for the potential impact from the mass emission rate standpoint.

Considering the size of the turbines and relatively low excess emission rate if exceedance did occurred, Ecology finds that annual compliance demonstration using EPA reference method and occasional monitoring using portable analyzer should be sufficient to ensure compliance. However, in addition to monitor the emission using portable analyzer at least once every 4,380 hours of operation, Ecology finds that NWP shall also demonstrate compliance using reference method after each engine exchange because the past historical events indicates that the exceedance could occur after the exchange. If engine exchange occurs within the same annual test frequency period, the reference test conducted after engine exchange can be used to satisfy annual compliance test requirement.

To offer a context of how often engine exchange could occur, Ecology has obtained the following information from NWP. During 2018, the Centaur 50S operated for 2,859 hours and Mars 90S operated for 6,747 hours. The turbines are generally exchanged once every 25,000 to 30,000 hours of operation. An exchange may occur sooner if a mechanical problem that cannot be addressed on-site is discovered with the turbine.

Ecology believes that this monitoring approach is practical and is sufficient to ensure that the combustion turbines meet the NO_x emission limit.

4.2. Portable analyzer accuracy verification

NWP also proposes to remove the requirement to conduct accuracy verification of the portable analyzer. The existing permit condition requires NWP to develop a protocol to verify the accuracy of the portable analyzer and conduct the accuracy test each calendar year. To verify the accuracy, NWP compares the measured concentration using portable analyzer to the concentration determined by independent lab using reference methods.

Ecology agrees to remove the accuracy verification requirements. Ecology finds that this requirement is unnecessary since Conditional Method 34 consists of repeatability check that ensure that the accuracy shall not vary more than ± 3 percent or ± 1 ppm, and is sufficient to ensure good measurement results for the monitoring purpose.

4.3. NO_x emission limit averaging period for the Sellers C-80-w boiler

For the Sellers C-80-w boiler, the existing NO_x concentration limit is 34 ppmdv over a 24-hour average corrected to three percent oxygen. Compliance with the NO_x emission concentration limit shall be determined in accordance with 40 CFR 60 Appendix A, Methods 7E and 19.

Ecology is revising the averaging period for the NO_x concentration limit to 3-hour from 24-hour basis for the following reasons:

- The averaging period will be more consistent with the standard reference test as compliance demonstration method.
- From the original PSD permit application, it appears that this limit was established based on the vendor's provided emission information. However, vendor did not provide any averaging period for the emission data. This emission appears to be established based on vendor's provided information without taking into consideration of the averaging period for compliance demonstration purpose.

4.4. Access and sampling ports requirements

This permit revision removes Condition 7 of PSD 01-09, Amendment 6. The condition requires NWP to provide access and sampling ports for testing. Ecology finds that it is unnecessary to include this condition in the PSD permit since WAC 173-400-105(4) and Appendix A of 40 CFR 60 provide equivalent requirements. These requirements are currently included in the facility's Title V Permit (AOP).

4.5. Operating rate during compliance test for combustion turbine

The existing permit condition did not address what should be the operating rate of the combustion turbine during annual compliance test. Ecology finds that it is important to require the combustion turbine to operate at representative maximum operating rate during the annual compliance test for compliance demonstration purpose. Therefore, this expectation is added to condition No. 14 through this amendment. Representative maximum operating rate means approximately ± 10 percent of the highest operating rate achieved during the calendar year of the compliance test.

5. State Environmental Policy Act

The Skagit County issued a State Environmental Policy Act (SEPA) Determination of Nonsignificant (DNS) on May 21, 2002, originally for the project. The proposal does not change the scope that was covered under the original SEPA determination. The revised permit conditions also is not expected to have additional environmental impact.

Ecology will incorporated the original SEPA DNS issued by reference for this action.

6. Environmental Justice Review

Environmental justice (EJ) is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Ecology conducts an EJ review to ensure no group of people bear a disproportionate share of the negative environmental consequences as the result of the permitting action.

Ecology finds that the EJ review is not needed because there is no emission increase as the consequences of this permitting action.

7. Public Involvement

This PSD permitting action was subject to a minimum 30-day public comment period under WAC 173-400-740. Ecology posts the public notice on Ecology's web site and accept public comment from December 16, 2019 through January 17, 2020.

Ecology did not receive any comment during the comment period for this project.

8. Agency Contact

MengChiu Lim, P.E.
Washington State Department of Ecology
Air Quality Program
P.O. Box 47600
Olympia, WA 98504-7600
360-407-6314
mengchiu.lim@ecy.wa.gov

Acronyms and Abbreviations

°F	degrees Fahrenheit
BACT	Best Available Control Technology
CFR	Code of Federal Regulations
CO	carbon monoxide
DNS	Determination of Nonsignificant
Ecology	Washington State Department of Ecology
EJ	Environmental Justice
EPA	United States Environmental Protection Agency
km	kilometers
kW	kilowatt
MMBtu	million British thermal units per hour
NAAQS	National Ambient Air Quality Standards
NO _x	nitrogen oxides
NWCAA	Northwest Clean Air Agency
NWP	Northwest Pipeline LLC
PEMS	Predictive Emissions Monitoring System
PM	particulate matter
PM ₁₀	particulate matter less than 10 micrometers in diameter
ppm	parts per million
ppmdv	parts per million on a dry volumetric basis
PSD	Prevention of Significant Deterioration
SEPA	State Environmental Policy Act
SO ₂	sulfur dioxide
tpy	tons per year
VOC	volatile organic compound
WAC	Washington Administrative Code